



Research Article

EFFECT OF ORGANIC SEED PRIMING ON SEED QUALITY OF FOXTAIL MILLET (*Setaria italica* L.)

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Abstract: Experiment was conducted to study the effect of organic seed priming on seed quality of foxtail millet. The experiment was carried out in the Seed Quality and Research laboratory, National Seed Project, University of Agricultural Sciences, Dharwad during 2018. Seed quality parameters were significantly influenced due to seed priming with organics. Among the different treatments seed priming with panchagavya (5 %) recorded significantly higher seed germination (86.7 %), root length (8.49 cm) whereas, panchagavya (3 %) recorded higher shoot length (10.83 cm), seedling dry weight (2.57 g), seedling vigour index-I (1650) and seedling vigour index-II (221) compared to control.

Keywords: Foxtail millet, Organic priming, Cow urine, Panchagavya, Vermiwash, Jeevamrutha, Hydro priming

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Introduction

Foxtail millet is essentially a dry land crop belonging to the family of graminaceae. The crop is cultivated in red and black soils under rainfed condition with an annual rainfall of 500 mm to 700 mm rainfall areas with a prolonged summer. Foxtail millet requires less rainfall than sorghum, maize, and wheat but success depends on strategic falls of rain.

This crop has interesting characteristic features *i.e.*, fairly tolerant to drought, and can escape terminal drought because of early maturity [1,2]. The availability of quality seed to the farmer at an affordable price and in time is considered crucial for enhancing and sustaining the agricultural productivity. Therefore, production of quality seed and maintenance of high seed germination is of utmost importance in a seed programme. Due to environmental concerns, there is need to reduce the use of chemical fertilizers intern increase the use of organics to improve the crop establishment and health. Organic seed priming provides hardness to high temperature, low moisture especially in semi-arid tropics. It promotes faster germination, higher seedling vigour leading to higher crop productivity. The main benefits of organic seed treatments include increased phosphate levels, nitrogen fixation and root development [3,4]. Organic seeds priming is more affordable so even small-scale farmers can practice. Keeping into view its importance as a vegetable and its adaptability to arid drought conditions, there is need for its improvement for yield. This can be achieved by maintaining plant population by organic seed priming.

Material and Methods

An experiment was conducted to study the effect of organic seed priming on seed quality of foxtail millet. The experiment was carried out in the Seed Quality and Research laboratory, National Seed Project, University of Agricultural Sciences, Dharwad during 2018. The seeds were primed with cow urine, panchagavya, vermiwash and Jeevamrutha at the concentrations of 3 and 5 % along with distilled water and dry seed as control. Seeds were added separately in 100 ml distilled water to get 3 % and 5 % of solution which were used for seed priming as per the required weight by volume ratio of seed to solution and soaked for 6 hours and dried under shade. The seeds were tested for the standard germination test adopted between paper method as per the ISTA rules [5].

The germination room maintained at 25 ± 1 °C and 90 ± 1 per cent relative humidity was maintained during the germination test. Vigour index values were computed using the following formula and the mean values were expressed in whole number [6].

$Vigour\ index\ I = Germination\ (\%) \times Total\ seedling\ length\ (cm)$

$Vigour\ index\ II = Germination\ (\%) \times dry\ matter\ production\ (g/10\ seedlings)$

The data from various experiments were analyzed statistically adopting the procedure [7]. Wherever necessary, the percentage values were transformed to arc sine values before carrying out the statistical analysis.

Results and Discussion

The experimental data revealed that seed priming with organics had significant effect on seed quality parameters [Table-1]. Seed primed with vermiwash with five percent (T₆) recorded significantly higher germination (86.7 %), root length (8.59 cm) followed by seed priming with panchagavya compare to control. The beneficial influence on germination of seeds may be due to increase of growth promoting substances in both vermiwash and panchagavya. Vermiwash is known to contain considerable amounts of growth promoting substances and hence might have brought this positive effect on the seed germination. Whereas, the increase in root length may be due to the presence of *Acetobacter* spp. bacteria present in panchagavya which is a species of biofertilizer group. It is mainly known for its plant growth promoting traits. Similar findings were reported by Sreenivasa and Naik (2011) [8], Tondey, *et al.*, (2021) [9]. Whereas, higher shoot length (10.83 cm), seedling length (19.19 cm) seedling dry weight (2.57 mg), seedling vigour index I (1650). Seedling vigour index II (221) recorded when seeds treated with panchagavya at three percent (T₃) over control. This increase in seedling growth parameters as well as vigour indices may be due to the presence of growth promoting substances and bio active compounds of coconut water which is present in panchagavya might have stimulated the hydrolysis of endosperm reserves for translocation of growing embryo to provide energy sources and produce vigorous seedlings. Intern this is responsible for increased metabolic activity of IAA and auxins, further helpful in early germination, cell division and cell elongation with increase in shoot length, seedling length and seedling dry weight.

Table-1 Effect of organic seed priming on seed germination, root length, shoot length, seedling dry weight, seedling vigour indices and electrical conductivity of foxtail millet

Treatments	Germination (%)	Root length (cm)	Shoot length (cm)	Seedling length (cm)	Seedling dry weight (mg)	Seedling vigour index- I	Seedling Vigour index -II	EC (dSm ⁻¹)
T ₁ : Cow urine (3%)	84.7 (66.9)	7.60	9.27	16.87	2.34	1428	198	0.50
T ₂ : Cow urine (5%)	85.7 (67.7)	7.88	9.88	17.76	2.40	1522	206	0.49
T ₃ : Panchagavya (3%)	86.0 (68.0)	8.36	10.83	19.19	2.57	1650	221	0.46
T ₄ : Panchagavya (5%)	86.3 (68.3)	8.49	10.03	18.52	2.50	1598	216	0.48
T ₅ : Vermiwash (3%)	85.3 (67.5)	8.02	9.33	17.35	2.34	1480	200	0.50
T ₆ : Vermiwash (5%)	86.7 (68.8)	8.59	9.92	18.51	2.43	1604	211	0.49
T ₇ : Jeevamrutha (3%)	84.0 (66.4)	7.23	9.07	16.30	2.31	1369	194	0.51
T ₈ : Jeevamrutha (5%)	85.7 (67.7)	7.58	9.64	17.22	2.38	1476	204	0.50
T ₉ : Hydropriming	83.3 (65.9)	7.07	8.85	15.92	2.28	1326	190	0.52
T ₁₀ : Control	80.3 (63.6)	6.67	8.73	15.40	2.17	1237	174	0.53
Mean	84.8 (67.0)	7.75	9.56	17.13	2.37	1469	201	0.50
S.E.m±	1.01	0.19	0.23	0.26	0.04	24.58	3.96	0.01
C.D at 1 %	2.98	0.57	0.69	0.78	0.12	72.52	11.67	NS

Krishnamurthy (2003) [10], Tiqua, *et al.*, (1996) [11], Sayi, *et al.*, (2018) [12] reported that the increase in seedling length is may be due to the presence of easily available organic carbon, N, P and K for the developing seedling and panchagavya contains *Acnetobacter* which is responsible for significant enhancement of seedling length [13]. These results were agreement with others findings [14,15].

Conclusion

From the results of present study, it can be concluded that seed quality could be improved through seed priming with organics which is a simple, easy, inexpensive, and eco-friendly approach to enhance the seed performance. These results have great practical significance, since it indicates the possibility of upgrading the quality of seed with help of simple seed priming like vermiwash and panchagavya. Looking at the cost of organic substances, these organics are cheaper and easy to be practiced by everyone at rural area.

Application of research: The effects of organic seed priming have practical applications in sustainable agriculture by enhancing seed germination rates and overall crop performance. Farmers can improve their yield potential and promote eco-friendly farming practices, contributing to increased food production with reduced environmental impact.

Research Category: Seed production, Organic farming

Abbreviations: IAA-Indole Acetic Acid
ISTA-International Seed Testing Association

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Study area / Sample Collection: Seed Quality and Research laboratory, National Seed Project, University of Agricultural Sciences, Dharwad

Cultivar / Variety / Breed name: DhFT-109-3

Conflict of Interest: None declared

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